# CLAIMS

What is claimed is:

1.    A method for deriving a seismic attribute file, comprising the steps of:

    a.    inputting horizon file data;

    b.    inputting attribute file data;

    c.    indexing from the attribute file data at corresponding geographic locations of the horizon file, forming an attribute file;

    d.    obtaining the gradient of the horizon file data thereby producing a horizon vector file;

    e.    obtaining the gradient of the attribute file thereby producing an attribute vector file; and

    f.    performing a compilation of the horizon vector file and the attribute vector file to ascertain if attribute changes in a direction towards a surface datum for a narrow time and depth range are detected and measured.

2.    The method of claim 1, wherein after the compilation is performed, horizon binning is performed.

3.    The method of claim 1, wherein the step of inputting of the attribute file data is performed by identifying portions of the attribute file that corresponds to a set of geographic coordinates in the horizon file data.

4.    The method of claim 3, wherein the geographic coordinates comprise:

    a.    X-Y prospect coordinate system;

    b.    X-Y field development system;

    c.    latitude and longitude;

    d.  internal 3D seismic survey coordinates; and

    e.  combinations thereof.

5.    The method of claim 4, wherein the geographic coordinates further comprises corresponding uncertainties.

6.    The method of claim 1, wherein the horizon file data is a time horizon file comprising a set of two-way seismic time values depicting the seismic travel time from the datum to the horizon of interest and back to a datum.

7.    The method of claim 1, wherein the horizon file data is a depth horizon file comprising a set of values which depict the depth from a datum to the horizon of interest

8.    The method of claim 1, wherein the attribute file data comprises:

    a.  a set of compiled seismic reflection data processed using a defined attribute generating algorithm, and extracted for a horizon of interest;

    b.  a set of compiled seismic reflection data processed using a defined attribute generating algorithm in conjunction with a horizon of interest;

    c.  a set of compiled seismic velocity data processed using a defined attribute generating algorithm and extracted for a horizon of interest;

    d.  a set of compiled seismic velocity data processed using a defined attribute generating algorithm in conjunction with a horizon of interest;

    e.  a set of geophysical gravity data extracted for a horizon of interest;

    f.  a set of geophysical gravity data compiled for a horizon of interest;

    g.  a set of geophysical gravity data collected for a horizon of interest;

    h.  a set of geophysical remote sensing data extracted for a horizon of interest;

    i.  a set of geophysical remote sensing data compiled for a horizon of interest;

j.  a set of geophysical gravity data collected for a horizon of interest;

k.  a set of compiled geologic measurements for a horizon of interest;

l.  a set of collected geologic measurements for a horizon of interest;

m.  a set of petro-physical measurements for a horizon of interest;

n.  a set of compiled or collected engineering data for a horizon of interest; and

o.  combinations thereof.

9.  The method of claim 1, further comprising the step of wherein one method of compilation is performed using dot product mathematics.

10.  The method of claim 9, wherein the dot product mathematics is a summation at each geographic location G of the product of corresponding elements of the horizon vector file and the attribute vector file at each geographic location G.

11.  The method of claim 9, wherein the compilation is performed only at geographic location G where all components of both the horizon vector file and the attribute vector file exist and are finite real numbers.

12.  The method of claim 1, wherein the step of indexing occurs by compiling both the horizon file data and the attribute file data in such a way that both files are described using the same geographic locations G.

13.  The method of claim 1, wherein the narrow range is less than 5% of the total time or depth range contained within the horizon file.

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